

Office Action Summary

Application No.

10/594,075

Applicant(s)

SVAROVSKY ET AL.

Examiner

SHAFIQUL HAQ

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 95 and 98-155 is/are pending in the application.
- 4a) Of the above claim(s) 99-149 and 151-154 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 95, 98, 150 and 155 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ ~~Copies of the certified copies of the priority documents have been received in this National Stage~~
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicants' amendments and arguments filed 4/22/2011 is acknowledged and entered. Claims 96-97 have been cancelled and new claims 150-155 have been added.

Newly submitted claims 151-154 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: New claims 151-154 if presented earlier (i.e. before the requirement of restriction/election mailed 9/14/2010), would have been grouped in Group II invention. Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 99-149 and 151-154 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Claims 95, 98, 150 and 155 are examined on merits to the extent it encompasses the elected species.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 95, 98, 150 and 155 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 95 recites "luminescence promoter comprising a mercapto triethylene glycol group that does not have an associated charge in solution".

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Luminescent promoter groups comprising a "mercapto triethylene glycol group that does not have an associated charge in solution" have not been clearly described in the specification and thus it is unclear what compound/groups are intended to encompass by the above recitation in the claimed luminescent promoter. Moreover, the solution is also not clearly described in the specification and different solutions impart different solubility/charge stage on a compound and thus the scope of the compounds encompassed by the above recitation is vague and indefinite.

6. Claim 150 is indefinite over the recitation of the term "mTEG" and "mTEG-SH" because it is an undefined acronym, the meaning of which may change over time. For clarity, it is suggested that the acronym be defined in the first instance when the acronym is recited in the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 95, 98, 150 and 155 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang *et al* (J. Am. Chem. Soc) in view of Lin *et al* (J. Am. Chem. Soc. 2002) and Bawendi *et al* ((US 6,306,610 B1).

Zheng *et al* teach ethylene glycol monolayer protected nanoparticles for eliminating nonspecific binding with biological molecules (see the title). Zheng

et al teach coupling of nanoparticles with thiolated ethylene glycol having different ethylene oxide repeats (e.g. 2, 3 or 4) and teach that nanoparticles so produced are very stable in aqueous solution that could withstand high salt concentration (2nd paragraph, 2nd col., first page). Zheng *et al* that these types of nanoparticles provide a fundamental starting material for designing hybrid materials composed of metallic nanoparticles and biomolecules and would be useful for synthesis of mixed monolayer of ethylene glycol and a functional ligand to eliminate nonspecific interactions and provide specific interaction at the same time (2nd paragraph, last page).

Zang *et al* disclose mercapto ethylene glycol protected gold nanoparticles for eliminating nonspecific binding with biological molecules but do not teach semiconductor nanoparticle with mercapto ethylene glycol.

Lin *et al* disclose gold nanoparticles functionalized with carbohydrate ligands (see scheme 1). Lin *et al* teach that besides gold nanoparticles, semiconductor nanoparticle bioconjugates as selective fluorescent biological labels have shown great potential in biological studies and medical applications (lines 1-13, 1st col. on page 3508).

Bawendi *et al* disclose semiconducting nanoparticles with core-shell are suitable for functionalization with SAM comprising thiols (see Fig. 10).

Therefore, given the fact that semiconducting nanoparticles is an art recognized alternative to gold nanoparticles (Lin *et al*) and semiconducting nanoparticles SAM comprising thiol groups (SH) are suitable for linking to semiconducting nanoparticle (Bawendi *et al*), it would be obvious to one of

ordinary skill in the art at the time the invention as made to consider substituting the gold nanoparticle of Zheng *et al* with the semiconducting nanocrystals of Lin *et al* or Bawendi *et al* to functionalize with the expectation of similarly providing nanoparticles with reduced non-specific binding for various biomedical application with a reasonable expectation of success. The reasonable expectation of success comes from the teaching of Bawendi *et al* that SAM comprising thiol groups can be coupled to surface of semiconducting nanocrystals and from the teaching of Lin *et al* that semiconductor nanoparticle show a great potential in biological studies and medical applications. Further, the Courts have ruled that art-recognized equivalence between embodiments provides a strong case of obviousness in substituting one material for another. See MPEP 2144.06.

With regard to claim 98, Bawendi *et al* teach semiconductor nanoparticle comprising cadmium telluride (CdTe) (col.12, line 43 and col.13, line 41).

With regard to claims 150 and 155, Zheng *et al* teach mercapto ethylene glycol $\{HS-(CH_2-CH_2-O)_n-CH_3$ comprising 2, 3 or 4 ethylene oxide group (when n=2, 3, and 4) for linking to nanoparticle surface. Zheng *et al* specifically disclose mercapto tetraethylene glycol on gold surface (see Fig. 2) but however, do not specifically disclose mercapto triethylene glycol immobilized on gold surface but however, the indiscriminate selection of "some" among "many" is *prima facie* obvious, *In re Lemn*, 141 USPQ 814 (1964). Therefore, in the instant case, one skilled in the chemical art would be

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motivated to choose variable substitutions for n to obtain the desired products in view of the known teaching of the art.

9. Claims 95-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barrientos *et al* (Chem. Eir. J. 2003) in view of Lin *et al* (J. Am. Chem. Soc. 2002), Bruchez *et al* (Science 1998), Bawendi *et al* ((US 6,306,610 B1) and Zhang *et al* (J. Am. Chem. Soc).

Barrientos *et al* disclose gold nanoparticles functionalized with sugar ligands for detection of the ligand specific analyte (see abstract and Introduction). Barrientos *et al* teach providing sugar ligands on the surface of gold nanoparticles using self-assembled monolayer (SAM) comprising alkanethiol derivatized with terminal sugar ligands (see page 1912). Barrientos *et al* teach providing water-soluble nanoparticles with different density of sugar ligands (see abstract) by incorporating SAM comprising terminal ethylene glycol units (page 1916, lines 3-6 on right col. and scheme 4B). The hybrid (mixed) SAM of Barrientos *et al* reads on the luminescent promoter (i.e. comprising ethylene glycol), a non-zinc linking group (i.e. thiol linker) and ethylene glycol unit linked to the surface through the linking group.

Barrientos *et al* disclose gold nanoparticles for functionalization with the ligand but do disclose semiconductor nanoparticle having a band gap for functionalization with sugar ligands. Barrientos *et al* disclose mercaptoethylene glycol (see Scheme 4.B) but do not teach the mercapto ethylene glycol comprising three ethylene groups.

Lin *et al* disclose gold nanoparticles functionalized with carbohydrate ligands (see scheme 1). Lin *et al* teach that besides gold nanoparticles, semiconductor nanoparticle bioconjugates as selective fluorescent biological labels have shown great potential in biological studies and medical applications (lines 1-13, 1st col. on page 3508).

Bruchez *et al* teach semiconductor nanocrystals as fluorescent labels (see abstract). Bruchez *et al* teach that core-shell nanocrystals are advantageous for being capable of generating spectrally tuned family of probes. Bruchez *et al* also teach providing nanocrystals with different fluorescent emissions (e.g. green, red) by variation in the core size of the nanocrystals (lines 1-28, 3rd col. on page 2014 and second paragraph, 2nd col. on page 2015).

Bawendi *et al* disclose semiconducting nanoparticles with core-shell suitable for functionalization with SAM comprising thiols (see Fig. 10).

Zheng *et al* teach ethylene glycol monolayer protected nanoparticles for eliminating nonspecific binding with biological molecules (see the title). Zheng *et al* teach coupling of nanoparticles with thiolated ethylene glycol having different ethylene oxide repeats (e.g. 2, 3 or 4) and teach that nanoparticles so produced are very stable in aqueous solution that could withstand high salt concentration (2nd paragraph, 2nd col., first page). Zheng *et al* teach that these types of nanoparticles provide a fundamental starting material for designing hybrid materials composed of metallic nanoparticles and biomolecules and would be useful for synthesis of mixed monolayer of ethylene glycol and a

functional ligand to eliminate nonspecific interactions and provide specific interaction at the same time (2nd paragraph, last page).

Therefore, given the fact that semiconducting nanoparticles is an art recognized alternative to gold nanoparticles (Lin *et al*) and semiconducting nanoparticles are advantageous for being capable of generating spectrally tuned family of probes (Bruchez *et al*), it would be obvious to one of ordinary skill in the art at the time the invention as made to consider semiconducting nanocrystals to functionalize with the sugar ligands of Barrientos *et al* with the expectation of similarly providing sugar label tuned fluorescent probes with a reasonable expectation of success. The reasonable expectation of success comes from the teaching of Bawendi *et al* that SAM comprising thiol groups can be coupled to surface of semiconducting nanocrystals and from the teaching of Bruchez *et al* providing nanocrystals with different fluorescent emissions by variation of core sizes. Further, the Courts have ruled that art-recognized equivalence between embodiments provides a strong case of obviousness in substituting one material for another. See MPEP 2144.06. Moreover, since Zheng *et al* teach that mercaptoethylene glycol having 2, 3 or 4 ethylene oxide provides a very stable nanoparticle in aqueous solution useful for designing mixed monolayer of ethylene glycol and a functional ligand to eliminate nonspecific interactions that provide specific interaction at the same time, it would also be obvious to one of ordinary skill in the art to consider the mercapto ethylene glycol of Zheng *et al* in the mixed monolayer for providing functionalized semiconducting nanoparticle with reduced

nonspecific binding with improved stability with a reasonable expectation of success.

With regard to claim 98, Bawendi *et al* teach semiconductor nanoparticle comprising cadmium telluride (CdTe) (col.12, line 43 and col.13, line 41).

With regard to claims 150 and 155, Zheng *et al* teach mercapto ethylene glycol $\{\text{HS}-(\text{CH}_2-\text{CH}_2-\text{O})_n-\text{CH}_3$ comprising 2, 3 or 4 ethylene oxide group (when n=2, 3, and 4) for linking to nanoparticle surface. Zheng *et al* specifically disclose mercapto tetraethylene glycol on gold surface (see Fig. 2) but however, do not specifically disclose mercapto triethylene glycol immobilized on gold surface but however, the indiscriminate selection of "some" among "many" is *prima facie* obvious, *In re Lemin*, 141 USPQ 814 (1964). Therefore, in the instant case, one skilled in the chemical art would be motivated to choose variable substitutions for n to obtain the desired products in view of the known teaching of the art.

Response to Applicant's argument

10. Applicants' arguments and amendments filed 4/22/2011 have been fully considered and are persuasive to overcome the rejections of 11/22/2010 under 35 U.S.C. 112 second paragraph, 35 U.S.C 102 and the rejections under 35 U.S.C 103. However, applicants' arguments have been rendered moot in view of the new grounds of rejection under 35 U.S.C. 112 second paragraphs and 35 USC 103 as described in this office action necessitated by Applicants' amendments. With regard to the presence of claim 99 in the rejection (35 U.S.C. 112 second paragraph) mailed 11/22/2010, the presence

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of the claim in the rejection is a clear clerical error, which is obvious from the withdrawal of claims 99-149 and the examined claims 95-98 as described in items 1 and 2 of the rejection mailed 11/22/2010.

Conclusion

11. No claims are allowed.

12. Applicants' amendment necessitated new ground(s) of rejection presented in this office action. Accordingly, **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

If Applicants should amend the claims, a complete and responsive reply will clearly identify where support can be found in the disclosure for each amendment. Applicant should point to the page and line numbers of the application corresponding to each amendment, and provide any statements that might help to identify support for the claimed invention (e.g., if the amendment is not supported in *ipsis verbis*, clarification on the record may be

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helpful). Should Applicants present new claims, Applicants should clearly identify where support can be found in the disclosure.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shafiqul Haq whose telephone number is 571-272-6103. The examiner can normally be reached on 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark L. Shibuya can be reached on 571-272-0806. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Shafiqul Haq/
Primary Examiner, Art Unit 1641